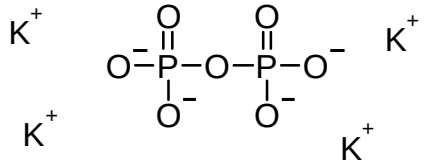
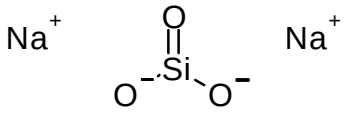
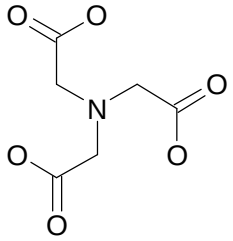
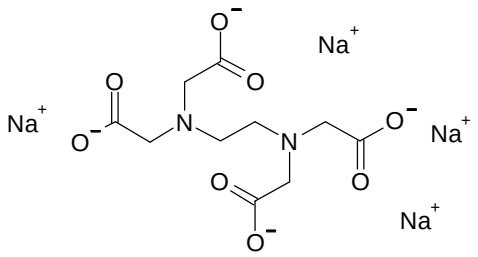
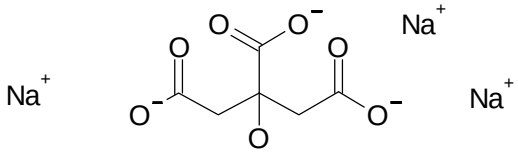
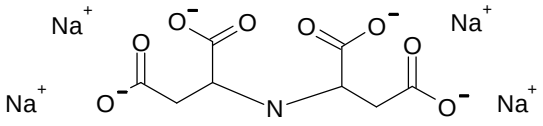
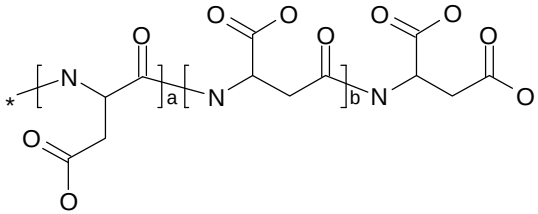
US EPA Design for the Environment Formulator Initiative

Category: Builders and Chelators
Positive Environmental Profile: Does not lead to oxygen depletion (via eutrophication) of environmental waters, the remobilization of heavy metals, or formulations with extreme pH; low health and environmental concerns.

Selected Properties for Representative Builders and Chelators

Name CAS Number	Structure	Biodeg [a] Rate Primary Ultimate	Aquatic concern conc.,[b] ppm	Other Concerns and Comments
Diphosphoric acid, tetrapotassium salt 7320-34-5			0.001 (eutrph.)	The concern concentration is for the eutrophication potential of this chemical, not its toxicity. Phosphates are plant nutrients that promote algal blooms.
Sodium metasilicate[f] 6834-92-0			0.20	Corrosive to eyes, skin, and mucous membranes. Strongly basic.
Nitrilotri(acetic acid) 139-13-9		hours-days days-weeks	0.47	Suspected human carcinogen

Name CAS Number	Structure	Biodeg.[a] Rate Primary Ultimate	Aquatic concern conc.,[b] ppm	Other Concerns and Comments
Ethylenediamine tetraacetic acid , tetrasodium salt 64-02-8		weeks- months months	1.1	May degrade to nitrilotri(acetic acid). Enhances the remobilization of heavy metals in the environment.
Citric acid, sodium salt 68-04-2		days- weeks weeks- months	0.3	Rapidly biodegradable, low toxicity. More positive environmental profile.
Iminodisuccinic acid, tetrasodium salt 144538-83-0		days- weeks weeks- months	8	Rapidly biodegradable, low toxicity. More positive environmetnal profile.
Polyaspartic acid				Biodegradable: 30-50% conversion to CO_2 in 3-5 days; > 70% conversion to CO_2 in 28 days.[c] 1996 Presidential Green Chemistry Challenge Award winner. More positive environmetnal profile.

a. Qualitative biodegradation half-lives were estimated using the BIOWIN program, which is included in the Estimation Programs Interface developed by Syracuse Research Corporation.

b. Concern concentrations were determined from measured or estimated aquatic toxicity data according to standard EPA protocols. Estimations were based on structure activity relationships and nearest analog data.

c. Alford, D.D.; Wheeler, A.P.; Pettigrew, C.A., **1994**, *J. Environmental Polymer Degradation*, 2, pp. 225-236.